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Taxonomic notes on chitons. On some species of *Chaetopleura* from South Africa (Mollusca: Polyplacophora: Ischnochitonidae)

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ABSTRACT

Taxonomic comments are given on some South African members of the polyplacophoran genus *Chaetopleura*. The species *C. pustulata* (Krauss, 1848) is here given species rank, based on examination of the type material. *Chaetopleura natalensis* Kaas & Van Belle, 1990 is placed in the synonymy of *C. pustulata* (Krauss, 1848). *Chaetopleura destituta* Sykes, 1902 formerly interpreted as synonym of *Chaetopleura pertusa* (Reeve, 1847) is shown to be conspecific with *Chaetopleura papilio* (Spengler, 1797). The transfer of *Lepidozona debruini* Strack, 1996 to *Chaetopleura* is indicated by a distinct perinotum coverage, radula characters and the position of the nephridiopore in relation to the ctenidia.

KEY WORDS: Mollusca, Polyplacophora, Chaetopleuridae, *Chaetopleura*, taxonomy, marine, Afrotropical.

INTRODUCTION

The genus *Chaetopleura* was erected for species defined as follows: 'Valvae transversae, externae; lamina insertionis valvarum terminalium plurilobata, posticae interdum subobsoleta, mediarum bilobata; limbus setis corneis obsitus' (Shuttleworth 1853: 190). More detailed descriptions of this genus are given by Day (1963: 4), Kilburn and Rippey (1982: 137), Ferreira (1983: 205), and most recently by Kaas and Van Belle (1987: 42).

Species of this group have a world-wide distribution, but most species occur in the tropical and subtropical regions of Africa, South and Central America. Of the 27 Recent species described to date (Kaas & Van Belle 1998), nine live along the coastline of the African continent and five of them inhabit South African waters (Kaas & Van Belle 1987, 1990). The aim of this paper is to clarify the taxonomic confusion regarding some South African *Chaetopleura* species.

MATERIAL AND METHODS

Material used for this study was kindly collected at the author's request by Mr Alan Seccombe (South Africa) and is part of the author's study collection, which will become the property of the Bavarian State Collection of Zoology (ZSM). Type material from the Natural History Museum, London, United Kingdom (BMNH), the Swedish Museum of Natural History, Stockholm, Sweden (SMNH) and the Natal Museum, Pietermaritzburg, South Africa (NM) was used for comparison. Detailed descriptions of the relevant species were provided by Kaas and Van Belle (1987, 1990).

TAXONOMY

Class Polyplacophora Gray, 1821
Order Neoloricata Bergenhayn, 1955
Family Chaetopleuridae Plate, 1899

Chaetopleura Shuttleworth, 1853

Type species: *Chiton peruvianus* Lamarck, 1819, by subsequent designation (Dall 1879: 296).

Chaetopleura pertusa (Reeve, 1847)

Fig. 1

The author received a single dried and partly disarticulated specimen on loan from the BMNH (BMNH 20010486), which is most probably the holotype. The terminal valves and valve ii (Fig. 1) are separate, while the remainder are *in situ*. The complete specimen measures 25.4 x 14.1 mm, is orange-brown, and fits well with the description of this species given by Kaas and Van Belle (1987: 85, fig. 37). The label, most probably in Philip Pearsall Carpenter's hand, reads as follow: 'Chaetopleura venusta (MS), South Africa M.C.'. Someone has later added: 'the evidence for this spec. being the holotype is based on it being a Cuming spec. from S. Africa and a comparison with the original illustration. "Simons Bay CGH" [Cape of Good Hope – E. Schwabe] was added at a later date, but could have been reproduced from original information that has since gone missing'.

In contrast to the species mentioned hereafter, *Chaetopleura pertus*a has numerous fine ribs, radially arranged on the terminal valves and the lateral areas, and longitudinally oriented on the central and antemucronal areas. The granules on the ribs are smaller than in *C. pustulata* (Krauss, 1848) but more prominent than in *C. papilio* (Spengler, 1797).

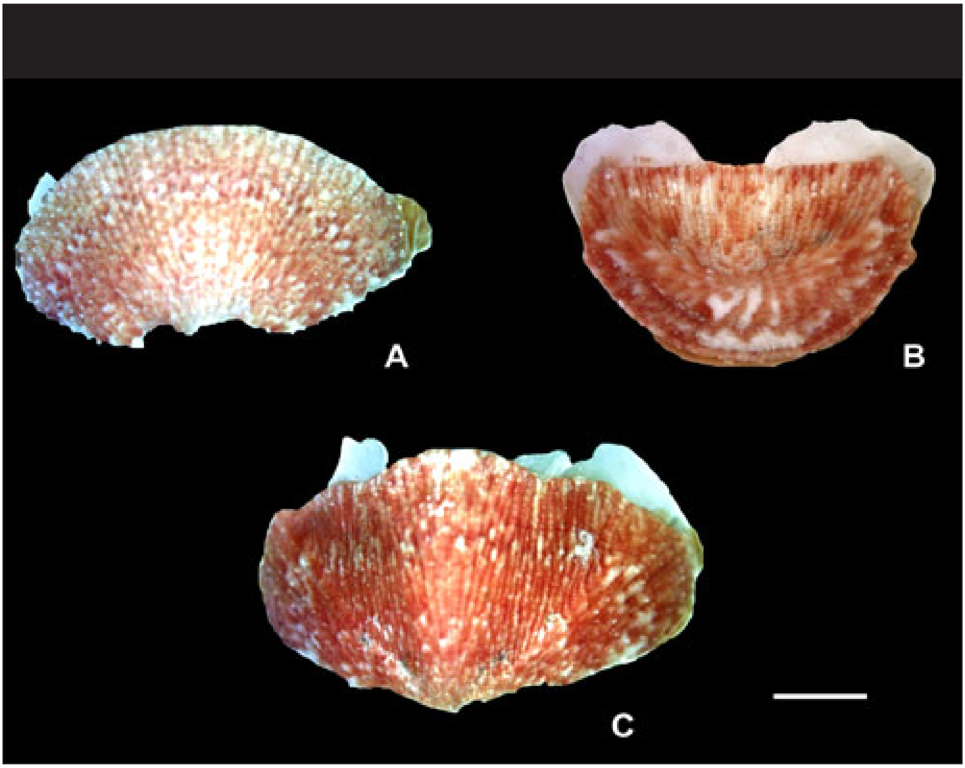

Fig. 1. *Chaetopleura pertusa* (Reeve, 1847), isolated valves of the probable holotype (BMNH 20010486): (A) dorsal view of the head valve, (B) dorsal view of the tail valve, (C) dorsal view of valve ii. Anterior of all valves at top. Scale bar = 2 mm.

Chaetopleura pustulata (Krauss, 1848)

Fig. 2

This beautiful species (Figs 2A–D), 'Eine sehr niedliche und ausgezeichnete Art.' to quote the original description, was described and illustrated in convincing detail by Krauss (1848: 42, pl. 3, fig. 7). The species' type locality is Natal, South Africa, where it was collected by J.A. Wahlberg, who sent the material to Krauss.

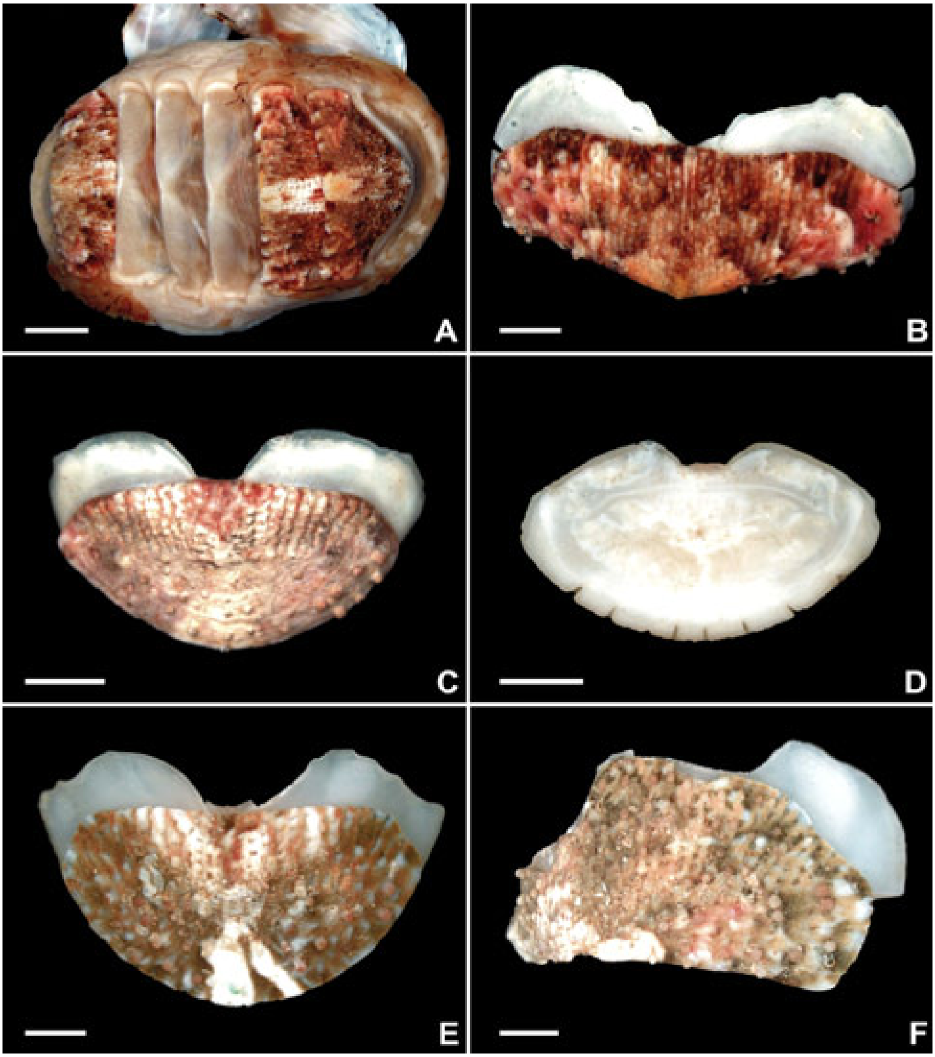

Fig. 2. *Chaetopleura pustulata* (Krauss, 1848): (A–D) partly disarticulated syntype of *Chiton pustulatus* Krauss, 1848 (SMNH # 4983): (A) dorsal view of the syntype, showing valves ii, iii and vii in situ, anterior at right, (B) dorsal view of valve iv, anterior at top, (C) dorsal view of the tail valve, anterior at top, (D) ventral view of the tail valve, anterior at top; (E–F) isolated valves of the holotype of *Chaetopleura natalensis* Kaas & Van Belle, 1990 (NM D4842): (E) dorsal view of the tail valve, anterior at top, (F) dorsal view of the right half of valve iv, anterior at top. Scale bars A = 2 mm, B–F = 1 mm.

Ashby (1931: 24) proposed 'to recognise Reeve's *C.* [*Chiton* – E. Schwabe] *pertusus* in *Chiton pustulatus* Krauss, for Reeve's description, figure, and locality can well be applied to that species..' and thus he synonymised the two taxa. Unfortunately, this decision was accepted (or just repeated) by subsequent authors (e.g. Barnard 1963; Kaas & Van Belle 1987, 1998; Slieker 2000) and *Chiton pustulatus* has fallen into oblivion.

While revising the world-wide species of *Chaetopleura*, Kaas and Van Belle (1990) correctely recognised that there are differences between characteristic specimens of *Chaetopleura pertusa* and specimens from KwaZulu-Natal, leading them to describe a new species *Chaetopleura natalensis*, from 13.5 km south of Tongaat, KwaZulu-Natal. As usual their description is very detailed and leaves no doubt that the separation of the two species is justified. What they overlooked is that there was already an identical species with 'Natal' as its type locality.

The present author examined the primary types of both taxa. *Chaetopleura pustulata* is available from a single specimen, wet and preserved flat, partly disarticulated with three valves still *in situ* (Fig. 2A) in the SMNH (# 4983). The specimen measures 13.3 x 9 mm ('6.5 x 4 lin.' in the original description = 13.7 x 8.5 mm). With the sample are four isolated valves, two intermediate and one tail valve (Figs 2B–D). The fourth valve is attributed by the present author to *Ischnochiton bergoti* (Vélain, 1877), meaning that the head valve and one intermediate valve are missing. From Krauss' description it

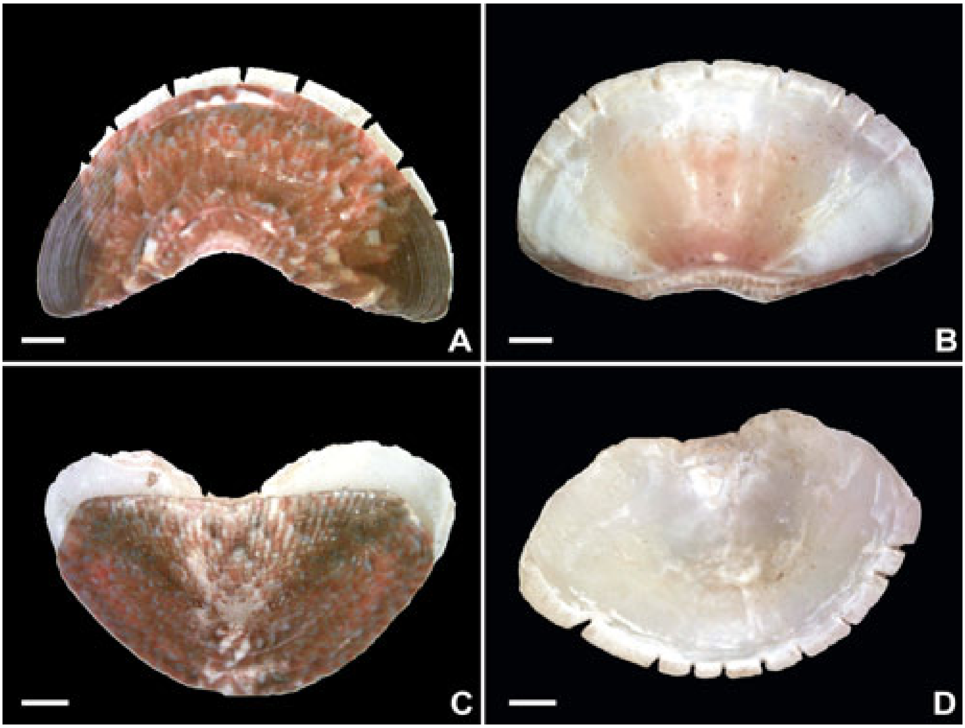

Fig. 3. *Chaetopleura papilio* (Spengler, 1797), isolated valves of the holotype of *Chaetopleura destituta* Sykes, 1902 (BMNH 1902.II.7.8): (A) dorsal view of the head valve, (B) ventral view of the head valve, (C) dorsal view of the tail valve, (D) ventral view of the tail valve. Anterior of all valves at top. Scale bars = 1 mm.

remains unclear how many specimens he had available, therefore I regard the single available specimen as a syntype. It is also indicated as such on the label.

The holotype of *Chaetopleura natalensis* Kaas & Van Belle, 1990, deposited in NM (D4842), is completely disarticulated. Soft parts are missing except for the dried perinotum. All valves except for the tail valve (Fig. 2E) are broken longitudinally. Despite the bad condition of the specimen it is obvious from the shell sculpture that this species does not differ in any way from the syntype of *Chiton pustulatus*, and thus I consider them to be conspecific, *Chaetopleura natalensis* being a junior synonym of *Chiton pustulatus*.

Chaetopleura papilio (Spengler, 1797)

Figs 3, 4

Among the type material of South African species which the author has been able to study was the holotype of *Chaetopleura destituta* Sykes, 1902 (BMNH 1902.11.7.8), which enables me to clarify the taxonomic position of this species. Ashby (1931: 26, pl. 4, figs 37–39) illustrated and described two specimens of *Chaetopleura destituta*, being aware that the material in his hands resembled *Chaetopleura papilio*, but interpreted valve differences as species characters. Barnard (1963: 333) correctely recognised that Ashby's *Chaetopleura destituta* is 'merely a low-arched and somewhat worn example of *papilio*...'. Unfortunately, only one page later the same author synonymised Sykes' *Chaetopleura destituta* with *Chaetopleura pertusa* (Reeve, 1847). This synonymy was accepted by Kaas and Van Belle (1987, 1998) and Slieker (2000), but a comparision with Sykes' type and the excellent illustration of the holotype of *Chiton papilio* Spengler, 1797 by Kaas and Knudsen (1992: 71, fig. 15) leaves no doubt that *Chaetopleura destituta* is conspecific with *Chaetopleura papilio*.

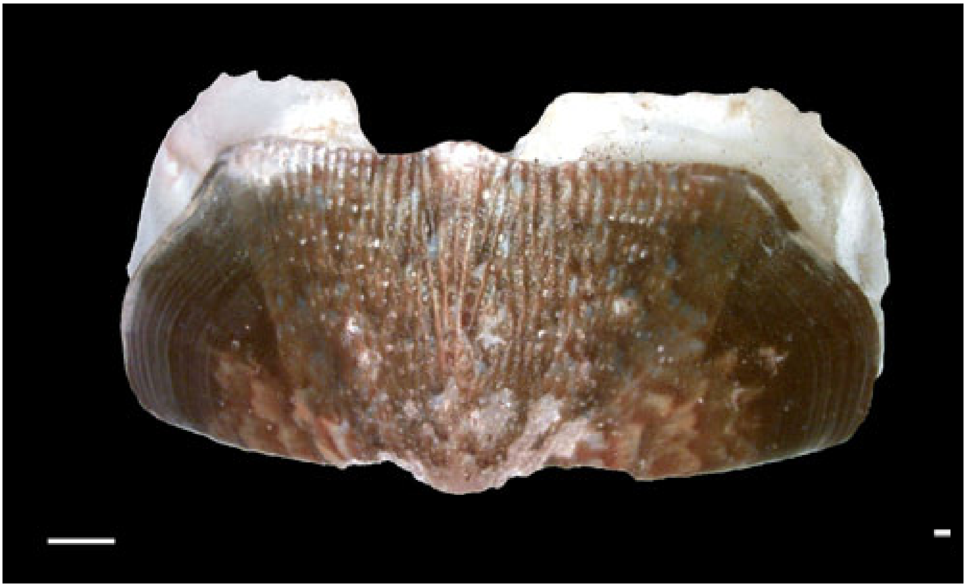

Fig. 4. *Chaetopleura papilio* (Spengler, 1797), dorsal view of valve vi of the holotype of *Chaetopleura destituta* Sykes, 1902 (BMNH 1902.II.7.8), anterior at top. Scale bar = 1 mm.

Chaetopleura debruini (Strack, 1996)

Fig. 5

The species Strack (1996) originally placed in the genus *Lepidozona* Pilsbry, 1892 has reticulate tegmentum sculpture, consisting of longitudinally arranged ribs on the central and antemucronal areas and radially arranged ribs on the head valve and on the postmucronal and lateral areas, each connected by minute bridges. Strack's original placement is understandable, and was caused by the general appearance strongly resembling *Lepidozona* (Fig. 5). In particular, the scale-like spicules of the perinotum reinforce this impression. Most recently, Kaas *et al.* 2006 placed the species in the genus *Chaetopleura*, although the argumentation was weak. The authors pointed out that the ventral perinotum scales are '...not featureless elongate rectangular elements like in *Lepidozona* (and several other genera), but the outer ends are differently sculptured'. However, their suggestion is supported by own examinations.

Several points justify transferring this species to *Chaetopleura*:

the dorsal perinotum shows minute tufts of hyaline hairs among the scale-like spicules (ZSM Mol 20041059);

the central radular tooth is rectangular and stocky (Strack 1996), a character that is more common in members of the genus *Chaetopleura*, whereas species of *Lepidozona* have a more elongate-rectangular central tooth that is usually tapered centrally (Kaas & Van Belle 1987);

the nephridiopore is situated between the third and fourth ctenidia from the posterior in wet-preserved specimens in a sample from Algoa Bay (ZSM Mol 20041059). This corresponds well with the study of Sirenko (1993), who pointed out that in

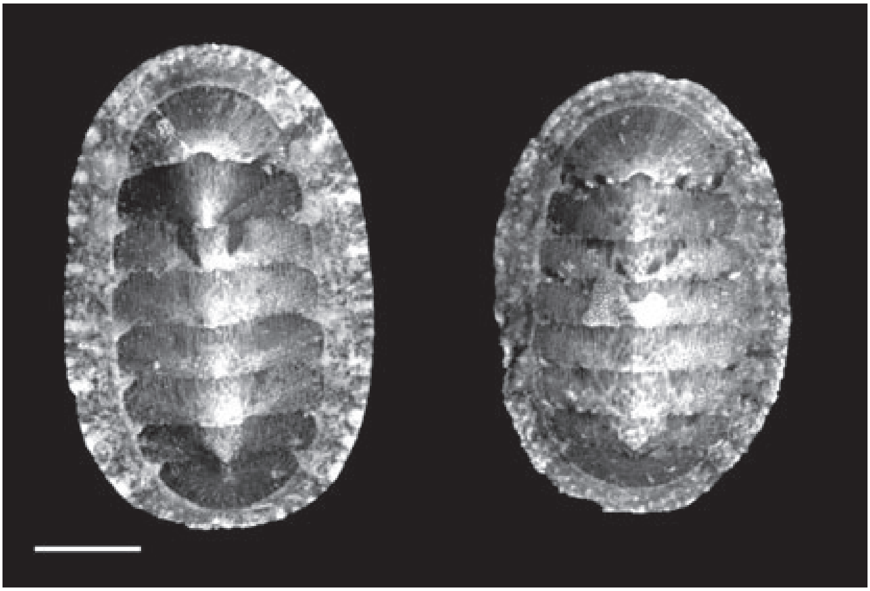

Fig. 5. *Chaetopleura debruini* (Strack, 1996), dorsal view of two specimens from Algoa Bay (ZSM Mol 20041059), anterior at top. Scale bar = 5 mm.

members of the genus *Chaetopleura* the nephridiopore is situated between ctenidia 3 and 4 (from the posterior), while species of *Lepidozona* have their nephridiopore behind ctenidium 5 from the posterior (he gave a range of between ctenidia 5/6 to 8/9).

DISCUSSION

With five species, the genus *Chaetopleura* is represented in South African waters by about 19% of the described species in the world (Kaas & Van Belle 1998). The genus was extensively revised by Kaas and Van Belle (1987, 1990) with full species descriptions, bibliographies and distribution data. Unfortunately, minor corrections are necessary to clarify the taxonomic position of some of the species. *Chaetopleura pertusa* (Reeve, 1847) was mentioned as having the holotype in the BMNH. The status of the available type remains unclear, and to enable further work on this topic, photographs of the relevant valves for determination are presented here for the first time. Examination of the species also has shown that two other taxa, *Chiton pustulatus* and *Chaetopleura destituta*, have to be removed from the synonymy of this species. A syntype of the first species was available for study, allowing differentiation from the probable holotype of *Chiton pertusus,* mainly on the basis of coarser valve sculpture. *Chaetopleura destituta* has a rather smooth valve with the exception of faint longitudinal jugal and antemucronal striation. The general appearance of this species strongly resembles that of *Chaetopleura papilio*, of which a good illustration of the type is available in Kaas and Knudsen (1992), and thus *C. destituta* is here synonymised with *C. papilio*.

Chaetopleura natalensis Kaas & Van Belle, 1990 is here regarded as a junior synonym of *Chiton pustulatus* Krauss, 1848 on the basis of a direct comparison of the primary types of both species. The South African *Lepidozona debruini* Strack, 1996, although having a *Lepidozona*-like tegmentum, has a scale-like perinotum coverage interrupted by hyaline hairs, a broad rectangular central radula tooth (Strack 1996), which may interpreted as *Chaetopleura*-like, and its nephridiopore position corresponds well with the condition described by Sirenko (1993) for other members of the genus *Chaetopleura*. Therefore, the transfer of *Lepidozona debruini* to *Chaetopleura* is here confirmed.

Thus, the five *Chaetopleura* species occuring in South Africa are:

Chaetopleura debruini (Strack, 1996), *C. papilio* (Spengler, 1797), *C. pertusa* (Reeve, 1847), *C. pomarium* Barnard, 1963 and *C. pustulata* (Krauss, 1848).

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